RULES
OF
TENNESSEE DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF BOILER AND ELEVATOR INSPECTION
BOARD OF BOILER RULES

CHAPTER 0800-3-3
BOILER INSPECTIONS

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0800-3-3-.01 DEFINITIONS. As used in this Chapter, unless the context otherwise requires:

(1) Act means the provisions of T.C.A. Title 68, Chapter 122.

(2) ANSI means the American National Standards Institute.

(3) API means the American Petroleum Institute.

(4) Alteration means a change in any item described on the original manufacturer's data report which affects the pressure containing capability of the boiler or pressure vessel. Non-physical changes, such as an increase in the maximum allowable working pressure (internal or external) or design temperature of a boiler or pressure vessel, shall be considered an alteration. A reduction in minimum temperature such that additional mechanical tests are required shall also be considered an alteration.

(5) Approved means approved by the Board of Boiler Rules.

(6) Authorized Inspection Agency means:

(a) A jurisdiction as defined by this rule; or

(b) An insurance company which has been licensed or registered by the appropriate authority of a state of the United States or a province of Canada to write boiler and pressure vessel insurance and to provide all inspection services required by the Act for boilers and pressure vessels insured by such company in this State.

(7) Board means the Board of Boiler Rules.

(8) Boiler means a closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof under pressure or vacuum, for the use external to itself, by the direct application of heat. The term boiler includes fired units for heating or vaporizing liquids other than water where these units are separate from processing systems and complete within themselves.

(a) Power boiler - A boiler in which steam or other vapor is generated at a pressure of more than 15 psig.

(b) High-temperature water boiler - A water boiler intended for operation at pressures in excess of 160 psig. or temperatures exceeding 250°F.

(Rule 0800-3-3-.01, continued)

(c) Heating boiler - A steam or vapor boiler operating at pressures not exceeding 15 psig. or a hot water boiler operating at pressures not exceeding 160 psig. or temperatures not exceeding 250°F.

(d) Electric boiler - A power or heating boiler in which the source of heat is electricity.

(e) Miniature boiler - A power or high-temperature water boiler which does not exceed the following limits:

1. 16 in. inside diameter of shell;

2. 20 sq. ft. heating surface (not applicable to electric boilers);

3. 5 cu. ft. gross volume exclusive of casing and insulation;

4. 100 psig. maximum allowable working pressure.

(f) Unfired steam boiler - An unfired pressure vessel or system of unfired pressure vessels intended for operation at a pressure in excess of 15 psig. steam for the purpose of producing and controlling an output of thermal energy.

(g) Waste heat boiler - An unfired pressure vessel or system of unfired pressure vessels intended for operation in excess of 15 psig. steam for the purpose of producing and controlling an output of thermal energy.

(h) Heat recovery boiler - A vessel or system of vessels comprised of one or more heat exchanger surfaces used for the recovery of waste heat.

(i) Steam heating boiler - A steam boiler for operation at pressures not exceeding 15 psig.

(j) Hot water heating boiler - A boiler in which no steam is generated, from which hot water is circulated for heating purposes and then returned to the boiler, and which is operated at a pressure not exceeding 160 psig. and/or a temperature of 250ºF at or near the boiler outlet.

(k) Hot water supply boiler - A boiler completely filled with water that furnishes hot water to be used externally to itself at pressures not exceeding 160 psig. and/or a temperature of 250ºF at or near the boiler outlet.

(l) Portable boiler - A boiler which is primarily intended for temporary location, where the construction and usage permits it to be readily moved from one location to another.

(m) Potable hot water heater - A heater supplying potable water for commercial purposes in which the pressure does not exceed 160 psig. and the temperature does not exceed 210ºF.

(9) Certificate of competency means a certificate issued to a person who has passed the examination prescribed by the Board pursuant to T.C.A. § 68- 122-109.

(10) Certificate of inspection means a certificate issued for operation of a boiler or pressure vessel, as required in T.C.A. §68-122-111.

(11) Certificate inspection means an inspection, the report of which is used by the Chief Inspector as justification for issuing, withholding, suspending or revoking a certification of inspection. This certificate inspection shall be an internal inspection when required; otherwise, it shall be as complete an inspection as possible.

(Rule 0800-3-3-.01, continued)

(a) Internal Inspection - As complete an examination as can reasonably be made of the internal and external surfaces of a boiler or pressure vessel while it is shut down and manhole plates, handhole plates or other inspection opening closures are removed as required by the inspector.

(b) External Inspection - An inspection made when a boiler or pressure vessel is in operation, if possible.

(12) Commission - The commission issued by the National Board of Boiler and Pressure Vessel Inspectors to a holder of a certificate of competency who desires to make shop or field inspections in accordance with the National Board Rules for Commissioned Inspectors, and whose employer submits the inspector's application to the National Board for such commission.

(13) Condemned boiler or pressure vessel means a boiler or pressure vessel that has been inspected and declared unsafe, or disqualified by legal requirements, by an inspector qualified to take such action who has applied a stamping or marking designating its rejection.

(14) Department - The Tennessee Department of Labor and Workforce Development.

(15) Existing installation means any boiler constructed, installed, placed in operation, or contracted for before July 1, 1955.

(16) Inspector means the Chief Inspector, any Deputy Inspector, Special Inspector, or Owner-User Inspector.

(a) Chief Inspector - The Chief Boiler and Pressure Vessel Inspector appointed pursuant to T.C.A. §68-122-106.

(b) Deputy Inspector - Any inspector appointed pursuant to T.C.A. §68-122-107.

(c) Special Inspector - An inspector holding a Tennessee certificate of competency, and who is regularly employed by an insurance company authorized to insure against loss from explosion of boilers or pressure vessels in this State.

(d) Owner-User Inspector - An inspector continuously employed by a company owning or operating pressure vessels in this State for the purposes of making inspections of pressure vessels used or to be used by such company, but not for resale, and providing such company complies with the requirements of T.C.A. §68-122-108.

(17) Jurisdiction means a state, commonwealth, county or municipality of the United States or a province of Canada which has adopted one or more sections of the ASME Code, one of which is Section 1, and maintains a duly constituted department, bureau or division for the purpose of enforcement of such Code.

(18) Licensed boiler and pressure vessel contractor means a person, firm, or corporation authorized to engage in the erection and/or repair of boilers and pressure vessels.

(19) Lined potable water heater means a water heater with a corrosion-resistant lining used to supply potable hot water.

(20) National Board means the National Board of Boiler and Pressure Vessel Inspectors (NB), 1055 Crupper Avenue, Columbus, Ohio 43229.

(21) National Board Inspection Code means the ANSI Standard NB-23 for boiler and pressure vessel repairs and alterations published by the National Board.

(Rule 0800-3-3-.01, continued)

(22) NFPA means National Fire Protection Association, Inc.

(23) Nuclear power plant means one or more nuclear power systems and containment systems.

(24) Nuclear power system means a system that serves the purpose of producing and controlling an output of thermal energy from nuclear fuel and those associated systems essential to the functions of the power system. The components of the system include such items as pressure vessels, piping systems, pumps, valves and storage tanks.

(25) New installation means any boiler constructed, installed, placed in operation or contracted for after July 1, 1949 and any pressure vessel constructed, installed, placed in operation or contracted for after July 1, 1955.

(26) Non-standard boiler or pressure vessel means a boiler or pressure vessel that does not bear the ASME stamp, the API- ASME stamp, or the stamp of any jurisdiction which has adopted a standard of construction equivalent to that required by the Board.

(27) Owner or User means any person, firm or corporation legally responsible for the safe installation, operation and maintenance of any boiler or pressure vessel within the jurisdiction.

(28) Owner-User inspection agency means an owner or user of pressure vessels who maintain a regularly established inspection department, whose organization and inspection procedures generally meet the requirements of the National Board rules and are acceptable to the Board.

(29) Pressure vessel means a vessel in which the pressure is obtained from an external source, or by the application of heat from an indirect source, or from a direct source other than those boilers defined in paragraph (8) of this rule.

(30) Psig means pounds per square inch gauge.

(31) Reinstalled boiler or pressure vessel means a boiler or pressure vessel removed from its original setting and reinstalled at the same location without change of ownership.

(32) Repair means the work necessary to restore a boiler or pressure vessel to a safe and satisfactory operating condition, provided there is no deviation from the original design.

(33) Second-hand boiler or pressure vessel means a boiler or pressure vessel which has changed both location and ownership since last used.

(34) Standard boiler or pressure vessel means a boiler or pressure vessel which bears the stamp of this State, the ASME stamp, the API-ASME stamp, both the ASME and National Board stamps, or the stamp of another jurisdiction which has adopted a standard of construction equivalent to that required by the Board.

(35) Historic power boilers means any steam traction engine, portable or stationary, standard or nonstandard power boiler, including free-lance and scale models, owned by publicly operated museums, non-profit organizations and individuals who preserve, maintain, exhibit and only occasionally operate these boilers on a not-for-profit basis and for the primary purpose of perpetuating the agricultural and pioneer heritage of Tennessee.

Authority: *T.C.A. §§4-5-202, 68-122-101, and 68-122-102.* ***Administrative History:*** *Original rule filed May 16, 1986; effective June 15, 1986. (Formerly rule 0780-2-11-.01) Amendment filed March 27, 1991; effective June 29, 1991. Amendment filed May 7, 1992; effective August 29, 1992. Amendment filed June 27, 2000; effective October 28, 2000. Amendment filed June 17, 2002; effective October 28, 2002.*

0800-3-3-.02 ADOPTION BY REFERENCE. Unless otherwise provided by applicable law or the provisions of this Chapter, the required minimum standard for the construction, installation, operation, maintenance, repair, alteration, testing and inspection of boilers and pressure vessels in the State of Tennessee shall be those prescribed in the following publications; as amended per adopted edition and addenda:

(1) Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers (ASME Code), published by the American Society of Mechanical Engineers, Three Park Avenue, New York, New York 10016-5990.

(2) National Board Inspection Code (NBIC), published by the National Board of Boiler and Pressure Vessel Inspectors (NB), 1055 Crupper Avenue, Columbus, Ohio 43229.

(3) Code for Unfired Pressure Vessels for Petroleum Liquids and Gases (API-ASME Code), published by the American Society of Mechanical Engineers in conjunction with the American Petroleum Institute.

(4) Controls and Safety Devices for Automatically Fired Boilers (ASME-CSD-1), published by the American Society of Mechanical Engineers.

(5) Boiler and Combustion Systems Hazards Code (NFPA 85), published by the National Fire Prevention Association, International, 1 Batterymarch Park, Quincy, Massachusetts 02269.

Authority: *T.C.A. §§4-5-202, 4-5- 202(a)(3), 68-122-101, and 68-122-102.* ***Administrative History:*** *Original rule filed May 16, 1986; effective June 15, 1986. Amendment filed September 30, 1986; effective December 29, 1986. (Formerly rule 0780-2-11-.02). Amendment filed March 27, 1991; effective June 29, 1991. Amendment filed June 27, 2000; effective October 28, 2000. Amendment filed June 17, 2002; effective October 28, 2002.*

0800-3-3-.03 ADMINISTRATION.

(1) Construction Standards

(a) No boiler or unfired pressure vessel shall be installed for operation in the State of Tennessee unless it is designed, constructed, inspected, stamped, and installed for the desired pressure and temperature in accordance with the provisions of this Chapter, the applicable section of the ASME Code, and other applicable law.

(b) Boilers and pressure vessels shall bear the National Board stamping and the manufacturer's NB number as registered with the National Board. A copy of the manufacturer's data report signed by the manufacturer's representative and the National Board commissioned inspector employed by the third party inspection agency shall be filed with the Chief Inspector when the boiler or pressure vessel is shipped into this State for installation.

(c) Electrically heated boilers subject to the ASME Code requirements shall bear the "Underwriters Laboratory" label in addition to the required ASME Code symbol stamp. This means that the boiler shall be supplied by the manufacturer as a complete unit and not converted in the field.

(d) 1. Power piping external to power boilers from the boiler to the first stop valve of a single boiler, and to the second stop valve in a battery of two or more boilers, is subject to the requirements of the ASME Code, Power Boilers, Section I. The design, fabrication, installation and testing of the valves and piping shall be in accordance with ASME B31.1.

2. Welded piping is subject to the ASME Code requirements for proper code certification, including stamping in conformance with the code and furnishing of applicable ASME data report forms for the owners and the Chief Inspector.

(2) "Tennessee Special" Boilers and Pressure Vessels. If a boiler or pressure vessel is of special design, or one that cannot bear the ASME and National Board stamping, details of the proposed construction

(including shop drawings) shall be submitted to the Chief Inspector. Approval for construction and installation as a "Tennessee Special" boiler or pressure vessel must be obtained from the Board before construction is started.

(3) Tennessee Standard Pressure Vessels.

(a) Vessels constructed by an owner-user who is authorized by the State as an owner-user inspection agency and who holds a valid certificate of authorization to use the ASME "U" Stamp shall be stamped "Tennessee Standard", provided the vessels are:

1. Inspected by an owner-user inspector holding a valid certificate of competency issued by the state of Tennessee; and

2. To be used exclusively by the owner-user and not for resale.

(b) Such vessels shall meet all requirements of the ASME Code, Section VIII, Division 1, except that they are inspected by an owner-user inspector.

(4) Frequency of Inspections. All boilers and pressure vessels subject to inspection under the ACT shall be inspected in accordance with the requirements of T.C.A. §68-122-110.

(5) Notification of Inspection.

(a) Certificate inspections, as required, shall be carried out prior to the expiration date of the certificate or within the two (2) month period following the expiration at a time mutually agreeable to the inspector and owner-user.

(b) External inspections may be performed by the inspector during reasonable hours and without prior notification.

(c) When, as a result of external inspection or determination by other objective means, it is the inspector's opinion that continued operation of the boiler or pressure vessel constitutes a danger to life of property, the inspector may order an internal inspection or an appropriate pressure test, or both, to evaluate conditions. In such instances, the owner or user shall prepare the boiler or pressure vessel for such inspections or tests as the inspector designates.

(6) Examination for Certificate of Competency.

(a) The examination of an inspector's certificate of competency will be held in conjunction with a quarterly meeting of the Board at such location as it designates.

(b) An application for the examination shall have education and experience equal to at least one of the following:

1. A degree from an accredited school in mechanical engineering, plus one year of experience in design, construction, operation or inspection of high-pressure boilers and pressure vessels;

2. A degree from an accredited school in a branch of engineering other than mechanical engineering, or an associate degree in mechanical technology, plus two years of experience in design, construction, operation or inspection of high-pressure boilers and pressure vessels;

3. A high school education (or the equivalent) plus three years of experience:

(Rule 0800-3-3-.03, continued)

(i) In high-pressure boiler and pressure vessel construction or repair; or

(ii) As an operating engineer in charge of high-pressure boiler operation; or

(iii) As an inspector of high-pressure boilers and pressure boiler operation; or

(c) An application for examination shall be submitted on the form prescribed by the Chief Inspector at least 45 days prior to the date of examination. Each application shall be accompanied by a non- refundable fee of one hundred dollars ($100.00).

(d) The Board may reject any application containing a willfully false or misleading statement.

(e) The Board will administer to qualified applicants a written examination dealing with the construction, maintenance, and repair of boilers and pressure vessels and their appurtenances.

(f) The Board may waive examination of an applicant who holds a valid commission or certificate of competency from a state that has a standard of examination substantially equal to that of this State, and a valid commission and current commission card issued by the National Board.

(7) Certificate of Competency and Identification Card.

(a) In order to be eligible to receive a certificate of competency, the applicant must be employed on full-time basis by an authorized inspection agency or owner-user inspection agency.

(b) A request for a certificate of competency and identification card shall be submitted by the employer on the form prescribed by the Chief Inspector. The request shall be accompanied by a non-refundable fee of fifty dollars ($50.00).

(c) When the holder of a certificate of competency ceases to be employed by the organization which requested the certificate, that organization shall return the certificate of competency and valid identification card to the Chief Inspector.

(d) Identification cards shall be renewable annually by application of the employer. The application shall be submitted not later than December 31 of each year, and shall be accompanied by a non-refundable fee of twenty-five dollars ($25.00) for each card.

(8) Conflict of Interest. An inspector shall not engage in the sale of any service, article or device relating to boilers, pressure vessels, or their appurtenances.

(9) Inspection reports.

(a) Deputy and Special Inspectors shall submit to the Chief Inspector on a form approved by the Board, an initial inspection report for each boiler and pressure vessel subject to inspection in this State. Complete data shall be submitted on a Board-approved form for each non-standard boiler or pressure vessel.

(b) Deputy and Special Inspectors shall submit to the Chief Inspector on a form approved by the Board, Re-Inspection reports of subsequent inspections of both standard and non-standard boilers and pressure vessels.

(c) Owner-user inspection agencies shall report in accordance with subparagraphs (a) and (b) above. Such reports shall be filed as provided in paragraph (12) of this rule.

(d) Inspection reports required by subparagraphs (a), (b) and (c) above shall be submitted within thirty days after the date of inspection.

(10) Insurance.

(a) An insurance company shall notify the Chief Inspector within thirty days of all boilers or pressure vessels, on which insurance is written, cancelled, not renewed or suspended.

(b) An insurance company shall conduct all required inspections to boilers and pressure vessels that are covered in the insurance policy, where premiums for specific inspection requirements are specified.

(c) If a special inspector employed by the insurance company does not perform the inspection required in subparagraph (b) above within ninety (90) days of the expiration date of the Certificate of Inspection, a Deputy Inspector may be called to perform such inspection to determine the safety compliance of such boiler or pressure vessel. In the event that a Deputy Inspector performs an inspection on an insured boiler or pressure vessel, the insurance company in question will be invoiced for a Special Inspection Fee, as specified in T.C.A. §68-122-113.

(11) Special Inspectors - Notification of Unsafe Boilers and Pressure Vessels.

(a) If a Special Inspector, upon first inspection of a new risk, finds that a boiler or pressure vessel, or any appurtenance thereof, is in such condition that his company would refuse insurance, the inspector shall immediately notify the Chief Inspector and submit a report on the defects.

(b) If, upon inspection, a Special Inspector finds a boiler or pressure vessel to be unsafe for further operation, he shall promptly notify the owner or user, stating what repairs or other corrective measures are required to bring the object into compliance with this Chapter. Unless the owner or user makes such repairs or adopts such other corrective measures promptly, the Special Inspector shall immediately notify the Chief Inspector. Until such corrections have been made, no further operation of the boiler or pressure vessel involved shall be permitted. If an inspection certificate of object is required and is in force, it shall be suspended by the Chief Inspector. When reinspection establishes that the boiler or pressure vessel is safe to operate, the Chief Inspector shall be notified. At that time, an inspection certificate (where applicable) may be issued.

(c) If a Special Inspector, while making required inspections, becomes aware of any other boilers or pressure vessels on the premises which are not registered in accordance with applicable law, he shall report this information to the owner or user of the boiler or pressure vessel and to the Chief Inspector within thirty days.

(12) Owner-User Inspection Agency. Each owner-user inspection agency shall:

(a) Conduct inspections of pressure vessels (not exempt under T.C.A. §68-122-105), utilizing only qualified inspection personnel, as provided in this Chapter;

(b) Retain on file where the equipment is inspected a true record or copy of each of the latest inspection reports submitted by the inspector;

(c) Execute and deliver to the Chief Inspector and those responsible for the operation of the pressure vessel a true report of each inspection, together with appropriate requirements or recommendations that result from such inspections.

(d) Promptly notify the Chief Inspector of any pressure vessel which does not meet the applicable requirements; and

(Rule 0800-3-3-.03, continued)

(e) Maintain inspection records, which shall be readily available for examination by the Chief Inspector or his authorized representatives during business hours. Such records shall include:

1. A list of each pressure vessel covered by the Act, showing a serial number and such abbreviated descriptions as may be necessary for identification; and

2. The date of the last inspection of each unit, and the approximate date for the next inspection (arrived at by applying the appropriate rules to all data available when the inspection record is complete).

(13) External Inspection - Disclosure of Defective Conditions. If, upon an external inspection, there is evidence of a leak or crack, sufficient covering of the boiler or pressure vessel shall be removed to permit the inspector to determine satisfactorily the safety of the boiler or pressure vessel. If the covering cannot be removed at that time, the inspector may order the operation of the boiler or pressure vessel stopped until the covering can be removed and proper examination made. The Chief Inspector shall be notified immediately.

(14) Notification of Accidents. The owner or user shall promptly submit to the Chief Inspector a detailed report of any accident that occurs to a boiler or pressure vessel. In the event of a personal injury or any explosion, notice shall be given immediately by telephone, telegraph or messenger; and neither the boiler or pressure vessel, nor any parts thereof, shall be removed or disturbed without the permission of the Chief Inspector, except for the purpose of saving human life or limiting consequential damage.

(15) Restamping of Boilers and Pressure Vessels.

(a) When the Code stamping of a boiler or pressure vessel becomes indistinct, the Inspector shall instruct the owner or user to have it restamped. The owner or user shall submit a request for authorization of restamping to the Chief Inspector. Proof of the original stamping shall accompany the request.

(b) If the Chief Inspector authorized restamping, it shall be done only in the presence of an Inspector, and shall be identical with the original stamping.

(c) The ASME Code symbol may be restamped only by the original manufacturer of the boiler or pressure vessel in the presence of the Inspector who signed the manufacturer's data report, or of an authorized Deputy Inspector. The witnessing Inspector shall file with the Chief Inspector a notice of completion of restamping, together with a facsimile of the stamping applied.

(16) Condemned Boilers and Pressure Vessels. The Chief Inspector or a Deputy Inspector shall stamp on any boiler or pressure vessel declared unfit for further service the letters "XXX" on either side of the State number. Such stamping (XXX OO XXX) will designate a condemned boiler or pressure vessel.

(17) Reinstallation of Boilers or Pressure Vessels. When a standard boiler or pressure vessel located in this State is moved outside the State for temporary use or repair, the owner or user shall apply to the Chief Inspector for permission to reinstall the boiler or pressure vessel in this State. When a non-standard boiler or pressure vessel is removed from this State, it shall not be reinstalled within this State without the permission of the Board.

(18) Installation of Second-Hand Boilers or Pressure Vessels. Second-hand equipment may not be installed unless the Chief Inspector approves an application for "Permission to Install" following an inspection by a Deputy Inspector.

(19) Reinstalled Boiler or Pressure Vessels. The owner or user shall apply to the Chief Inspector for permission to reinstall a boiler or pressure vessel in this State.

(Rule 0800-3-3-.03, continued)

(20) Working Pressure for Existing Installations. Any Inspector may decrease the maximum working pressure on any existing installation if the condition of the boiler or pressure vessel warrants.

(21) Repairs and Alterations

(a) Repairs and alterations shall not be made without the permission of an Inspector employed by the Authorized Inspection Agency responsible for the in-service inspection of the subject boiler or pressure vessel. Such repairs and alterations shall be done in accordance with the National Board Inspection Code. The inspector authorizing the repair or alteration shall sign the necessary National Board "NB-R" form or forms.

(b) The person, corporation, partnership or firm performing the repair or alteration shall have a valid license in accordance with T.C.A. §§ 68-122-201 through 68-122-209. In order to qualify for such license the applicant shall have a valid certificate of authorization from the National Board for the use of a Repair Code Symbol stamp.

(22) Safety Appliances.

(a) No person shall attempt to remove, or do any work on, any safety appliance prescribed by this Chapter while the appliance is subject to pressure.

(b) Should any such appliance be removed for repair during an outage of a boiler or pressure vessel, it shall be reinstalled and in proper working order before the object is again placed in service.

(c) No person shall alter any safety or safety relief valve or pressure relief devices in any manner to maintain a working pressure in excess of that stated on the boiler or pressure vessel inspection certificate.

(d) Only the holder of a valid Certificate of Authorization for use of the National Board "VR" stamp, or an owner-user's maintenance organization approved by the Chief Inspector, may repair safety or safety relief valves. An owner-user maintenance organization shall be limited to repairing such valves for its own use.

(23) Accessibility to Code Stamping. Code stamping shall not be concealed by lagging or paint. The stamping shall be exposed at all times, unless a suitable record is kept of the location of the stamping so that it may be readily uncovered when desired.

(24) Application of State Serial Numbers. Upon completion of the installation of a boiler or pressure vessel, or at the time of the initial certificate inspection of an existing installation, the Inspector shall tag each boiler or pressure vessel in the vicinity of the code stamping with a Board approved and Department supplied registration tag.

(25) Exemptions. Potable hot water heaters are exempt from the "Construction Standards" requirements of rule 0800-3-3-.03(1)(a) and (b) when neither of the following limitations are exceeded:

(a) Heat input of 199,999 BTU/hr.

(b) Water temperature of 210ºF. However, such potable hot water heaters, with a heat input of between 100,000 and 199,999 BTU/hr., are subject to registration, inspection and inspection certificate requirements. These vessels are required to have an NB rated, ASME constructed, test-lever pressure-temperature activated safety relief device.

Authority: *T.C.A. §§4-5-202, 4-5- 202(a)(3), 68-122-101 through 68-122-104, 68-122-108 through 68-122-113, and 68-122-116.* ***Administrative History:*** *Original rule filed May 16, 1986; effective June 15, 1986. (Formerly rule 0780-2-11-03) Amendment filed March 27, 1991; effective June 29, 1991. Amendment filed May 7, 1992;*

(Rule 0800-3-3-.03, continued)

effective August 29, 1992. Amendment filed June 27, 2000; effective October 28, 2000. Amendment filed March 30, 2001; effective July 30, 2001. Amendment filed June 17, 2002; effective October 28, 2002.

0800-3-3-.04 GENERAL REQUIREMENTS.

(1) Preparation for Inspection. The owner or user shall prepare each boiler or pressure vessel for inspection on the date assigned by the inspector. Whenever necessary, the owner or user shall prepare for and apply a hydrostatic or pressure test on the inspection date. The date of the inspection shall not be less than seven (7) days after the date of notification.

(a) The owner or user shall prepare a boiler for internal inspection in the following manner

1. Draw off water and wash the boiler thoroughly.

2. Remove manhole and handhole plates, washout plugs and inspection plugs in water column connections (as required by the inspector). Cool and clean the furnace and combustion chambers.

3. Remove all grates of internally fired boilers.

4. Remove insulation or brickwork (as required by the inspector) in order to determine the condition of the boiler, headers, furnace, supports or other parts.

5. Remove the pressure gauge for testing (as required by the inspector).

6. Prevent any leakage of steam or hot water into the boiler by disconnecting the pipe or valve at the most convenient point, or any other appropriate means approved by the inspector.

7. Before opening the manhole or handhole covers and entering any parts of the steam-generating unit connected to a common header with other boilers, close, tag and (preferably) padlock the steam-stop valves; and open drain valves or cocks between the two valves. After draining the boiler, close, tag, and (preferably) padlock the blowoff valves. Disconnect blowoff lines (where practicable) between pressure parts and valves. Open all drains and vent lines.

(b) The owner or user shall prepare a pressure vessel for inspection to the extent deemed necessary by the inspector and in accordance with the applicable procedures outlined in subparagraph (a) above.

(c) No employee or inspector shall be permitted to enter a boiler drum or pressure vessel until the plant inspector or supervisor and the person entering the pressure vessel have confirmed that all stop valves on inlet and outlet piping (not vented to atmosphere) have been closed and tagged. When not valved, the piping shall be disconnected or blanked. In addition, plant personnel shall make appropriate tests to assure that there is no oxygen deficiency or hazardous or toxic gases in the drums or pressure vessels to be entered by the inspector. The oxygen content of the breathable atmosphere shall be between 19.5% and 23.5%.

(2) Boilers and Pressure Vessels Improperly Prepared for Inspection. The inspector may decline to conduct an inspection or test, and withhold or suspend the inspection certificate, if the owner or user:

(a) Fails to properly prepare a boiler or pressure vessel for inspection; or

(b) Fails to comply with the requirements of this Chapter pertaining to pressure testing.

(Rule 0800-3-3-.04, continued)

(3) Jacketed. If a boiler or pressure vessel is jacketed so that the longitudinal seams of shells, drums, or domes cannot be seen, the owner or user shall remove sufficient jacketing, setting wall, or other form of casting of housing to permit reasonable inspection of the seams and other areas necessary to determine the condition and safety of the boiler or pressure vessel, provided such information cannot be determined by other means.

(4) Lap Seam Crack. A boiler or pressure vessel shall be immediately discontinued from use if a lap seam crack is discovered along a longitudinal riveted joint of the shell or drum. Patching shall be prohibited. (A "lap seam crack" is a crack found in lap seams, extending parallel to the longitudinal joint and located either between or adjacent to rivet holes.)

(5) Pressure Tests.

(a) A pressure test, when applied to boiler or pressure vessels, shall not exceed 1 ½ times the maximum allowable working pressure. The pressure shall be under proper control so that in no case shall the required test pressure exceed that which is allowed by the applicable ASME code of construction.

(b) During a pressure test, the safety valve or valves shall be removed, or each valve disc shall be held to its seat by means of a testing clamp (not by screwing down the compression screw upon the spring). A plug device designed for the purpose may be used.

(c) The temperatures of the water used to apply a pressure test shall not be less than 70ºF and the temperature during inspection shall not exceed 120ºF.

(d) When a pressure test is applied to determine tightness, the pressure shall be equal to the normal operating pressure, but need not exceed the release pressure of the safety valve having the lowest release setting.

(e) When the contents of the vessel prohibit contamination by any other medium or when a pressure test is not possible, other testing media may be used providing the precautionary requirements of the applicable section of the NBIC are followed.

(6) Automatic Low Water Fuel Cutoff and/or Water Feeding Device.

(a) Each automatically-fired boiler shall be equipped with one or more automatic low-water fuel cutoff device conforming to the requirements of ASME CSD-1, latest edition/addenda adopted by the Board. If a waterfeeding device is installed, it shall be so constructed that the water inlet valve cannot feed water into the boiler through the float chamber, and so located as to supply requisite feedwater. The lowest safe waterline should not be lower than the lowest visible part of the water glass.

(b) Such fuel or feedwater control device may be attached directly to a boiler, or for low-pressure boiler to the tapped openings provided for attaching a water glass directly to a boiler, provided that such connections from the boiler are nonferrous tees or Y's not less than ½ inch pipe size between the boiler and the water glass, so that the water glass is attached directly and as close as possible to the boiler. The ends of all nipples shall be reamed to full-size diameter.

(c) Designs embodying a float and float bowl shall have a vertical straightway valve drain pipe at the lowest point in the water equalizing pipe connections by which the bowl and the equalizing pipe can be flushed and the device tested.

(7) Pressure Reducing Valves.

(Rule 0800-3-3-.04, continued)

(a) Where pressure-reducing valves are used, one or more safety or safety relief valves shall be provided on the low-pressure side of the reducing valve when the piping or equipment on the low-pressure side does not meet the requirements for the full initial pressure. The safety or safety relief valves shall be located adjoining or as close as possible to the reducing valve.

(b) Proper protection shall be provided to prevent injury or damage caused by escaping vapor or fluid from the discharge of safety or safety valves if vented to the atmosphere. The combined discharge capacity of the safety or safety relief valves shall be such that the pressure rating of the lower pressure piping equipment will not be exceeded in case the reducing valve fails in the open position.

(c) Use of hand-controlled bypasses around reducing valves is permissible. If a bypass is used around the reducing valve, the safety valve required on the low pressure side shall be of sufficient capacity to relieve all the vapor or fluid that can pass through the bypass without overpressuring the low pressure side.

(d) A pressure gauge shall be installed on the low pressure side of a reducing valve.

(8) Boiler Blowoff Equipment.

(a) The blowdown from a boiler or boilers that enters a sanitary sewer system or blowdown which is considered a hazard to life or property shall pass through some form of blowoff equipment that will reduce pressure and temperature as required hereunder.

1. The temperature of the water leaving the blowoff equipment shall not exceed 150ºF.

2. The pressure of the blowdown leaving any type of blowoff equipment shall not exceed 5 psig.

3. All blowoff equipment shall be fitted with openings to facilitate cleaning and inspection.

(9) Location of Discharge Piping Outlets. The discharge of safety valves, blowoff pipes and other outlets shall be located and supported so as to prevent injury to personnel.

(10) Repairs or Alterations.

(a) Before any necessary repairs or alterations are made, an inspector employed by the authorized inspection agency responsible for the in-service inspection of the boiler or vessel shall be consulted. After such repairs or alterations are made, they shall be reviewed and found acceptable by the authorizing inspector.

(b) Repairs shall be made by an organization holding a current National Board Repair Certificate of Authorization and the license required by rule 0800-3-3-.03(21).

(c) Alterations shall be made by an organization holding a current National Board Repair Certificate of Authorization and the license required by rule 0800-3-3-.03(21).

(d) In the application of riveted patches, the design of the patch and the method of installation shall be in accordance with the National Board Inspection Code, 1973 edition as amended.

(11) Supports. Each boiler and pressure vessel shall be supported by masonry or structural supports of sufficient strength and rigidity to safely support the boiler or pressure vessel and its contents. There shall be no excessive vibration in either the boiler, pressure vessel or its connecting piping.

(12) Boiler Door Latches.

(a) A watertube boiler shall have firing doors of the inward-opening type, unless such doors are provided with substantial and effective latching or fastening devices, or are otherwise so constructed as to prevent them, when closed, from being blown open by pressure on the furnace side. These latches or fastenings shall be of the positive self-locking type. Friction contacts, latches, or bolts actuated by springs shall not be used. The foregoing requirements for latches or fastenings shall not apply to coal openings of downdraft or similar furnaces.

(b) All other doors, except explosion doors, not used in the firing of the boiler, may be provided with bolts or fastenings in lieu of self-locking latching devices.

(c) Explosion doors, if used and if located in the setting walls within 7 feet of the firing floor or operating platforms shall be provided with substantial deflectors to divert the blast.

(13) Clearance.

(a) When boilers are replaced or new boilers are installed in either existing or new buildings, a height of at least 3 feet shall be provided between the top of the boiler proper and the ceiling or roof, and at least 3 feet between all sides of the boiler and adjacent walls or other structures. Boilers and pressure vessels having manholes shall have 5 feet clearance from the manhole opening and any wall, ceiling or piping that will prevent a person from entering the boiler or vessel. All boilers and pressure vessels shall be so located that adequate space will be provided for the proper operation of the boilers and pressure vessels and their appurtenances, for the inspection of all surfaces, tubes, waterwalls, economizers, piping valves and other equipment, and for the necessary maintenance, repair and replacement of tubes.

(b) A variance from the requirements of (a) above may be issued by the Chief Inspector for the installation of a Steam Heating, Hot Water Heating, Hot Water Supply, or Unfired Steam Boilers or Unfired Pressure Vessels. All requests must be submitted to the Chief Inspector prior to installation.

(14) Ladders and Runways. When necessary for safety, there shall be a steel runway or platform of standard construction installed across the tops of adjacent boilers or pressure vessels or at some other convenient level for the purpose of affording safe access. All walkways shall have at least two means of exit, each to be remotely located from the other.

(15) Exit from Boiler Room. Any boiler room exceeding 500 square feet floor area and containing one or more boilers having a fuel-burning capacity of 1,000,000 BTU/hr., or equivalent electrical heat input, shall have at least two means of exit. Each exit shall be remotely located from the other. Each elevation in such boiler room shall have two means of exit, each remotely located from the other.

(16) Air and Ventilation Requirements - Combustion Air Supply and Ventilation of Boiler Room. A permanent source of outside air shall be provided for each boiler room to permit satisfactory combustion of the fuel as well as proper ventilation of the boiler room under normal operating conditions.

(a) Total requirements of the burners for all fired pressure vessels in the boiler room must be used to determine the louver sizes, whether fired by coal, oil or gas; however, the minimum net free louvered area must not be less than one square foot. The following table or formula shall be used to determine the net louvered area in square feet:

Input BTU/Hour	Required Air Cu.Ft. /Min.	Min. Net Louvered Area Sq. Ft.
500,000	125	1.0
1,000,000	250	1.0

(Rule 0800-3-3-.04, continued)

2,000,000	500	1.6
3,000,000	750	2.5
4,000,000	1,000	3.3
5,000,000	1,250	4.1
6,000,000	1,500	5.0
7,000,000	1,750	5.8
8,000,000	2,000	6.6

$$\text{CFM} = \frac{\text{BTUH}}{10{,}000} \times 2.5$$

$$\text{Min. Net Louvered Area Required (Sq. Ft.)} = \frac{\text{CFM}}{300}$$

(b) When mechanical ventilation is used in lieu of subparagraph (a) above, the supply of combustion and ventilation air to the boiler room and the firing devices shall be interlocked with the fan so the firing device will not operate with the fan off. The velocity of the air through the ventilation fan shall not exceed 500 feet per minute, and the total air delivered shall be equal to or greater than shown in sub-paragraph (a) above.

(17) Gas Burners. For installations which are gas-fired, the burners used shall conform to the applicable requirements of the American Gas Association, or other nationally recognized standards acceptable to the Board.

(18) Prevention of Furnace Explosions. Fuel-burning equipment, the related safety devices and controls, and their operation shall be in accordance with the requirements of ASME CSD-1, or the NFPA 85 latest edition/addenda adopted by the Board, as applicable.

(19) Fired Jacketed Steam Kettles. Fired jacketed steam kettles may be constructed under the rules of the ASME Pressure Vessel Code, Section VIII, provided the following requirements are met:

(a) Welded joints in contact with products of combustion shall be of Type No. 1 of Table UW-12, ASME Code, Section VIII.

(b) When parts subjected to pressure are made of carbon steel material, the minimum thickness shall be ¼ inch. The minimum thickness of stainless steel or nonferrous pressure parts shall be as specified in the applicable part of Subsection C, ASME Code, Section VIII.

(c) When in contact with products of combustion, carbon steel material shall be pressure vessel quality and austenitic stainless steel parts shall be either extra-low carbon or stabilized grades.

(d) Structural grade carbon steel shall not be used for any pressure part.

(e) The operating pressure of the jacket shall not exceed 50 psig.

(f) Vessels constructed under this rule shall be inspected by an authorized inspector. Such vessels marked with the UM Symbol are not acceptable.

(g) No steam or water shall be withdrawn from the jacket for use externally to the vessel.

(h) The capacity of the safety valve in pounds of steam per hour shall be at least equal to the BTU rating of the burner divided by 1000.

(i) The jacket shall be equipped with the following minimum appurtenances and controls.

1. A pressure gauge;

2. A water gauge glass;

3. A separate connection, fitted with a check valve and stop valve, for adding water to the jacket;

4. An automatic gas valve controlled by pressure or temperature to maintain the steam pressure in the jacket below the safety valve setting;

5. A low water cutoff that will cut off the fuel to the burner if the water in the jacket drops below the lowest permissible water level as established by the manufacturer; and

6. A safety pilot control that will cut off the fuel to both the main burner and the pilot burner in case of pilot flame failure.

(20) Electric Boilers. All appliances required for electric steam boilers shall be attached in accordance with the following rules.

(a) The grounding of the boiler shall be permanently fastened on some part of the boiler, and shall be grounded in accordance with the National Electrical Code, NFPA 70.

(b) A suitable screen or guard shall be provided around high tension bushings; and a sign shall be posted warning of high voltage. This screen or guard shall be so located that it will be impossible for anyone working around the boiler to accidentally come in contact with the high tension circuits. During the adjustment of safety valves, the power circuit to the boiler shall be open. The boiler may be under steam or water pressure, but the power line shall be open while the operator is making the necessary adjustments.

(c) The minimum safety valve or safety relief valve relieving capacity for electric boilers shall be 3½ pounds per hour per kilowatt input.

(21) Flue Connection. Each gas-fired boiler shall be equipped with a vent or flue which shall terminate at any acceptable location outside the building. The size of the vent or flue shall be that recommended by the boiler manufacturer.

(22) Attendants for Power Boilers.

(a) A power boiler having a rating of either 5 h.p. or 50 sq. ft. of heat- absorbing surface or greater shall not be operated for periods of longer than twenty (20) minutes without being checked by an attendant who has been qualified by the owner in its operation, regardless of whether the boiler is equipped with automatic feedwater regulator, fuel or damper regulator, high and low water alarm, or other form of automatic control.

(b) A variance from the requirements of (a) above may be issued by the Board. All requests must be submitted to the Chief Inspector no less than forty-five (45) days prior to the next regularly scheduled or called meeting of the Board.

(23) Conditions not Covered. The Chief Inspector shall be consulted for any conditions not covered by these requirements.

Authority: *T.C.A. §§4-5-202, 4-5-202(a)(3), 68-122-101 through 68-122-104, 68-122-110 through 68-122-113, and 68-122-116.* ***Administrative History:*** *Original rule filed May 16 1986; effective June 15, 1986. (Formerly rule 0780-2-11-.04) Amendment filed March 27, 1991; effective June 29, 1991. Amendment filed June 27, 2000; effective October 28, 2000. Amendment filed March 30, 2001; effective July 30, 2001. Amendment filed June 17, 2002; effective October 28, 2002.*

0800-3-3-.05 EXISTING POWER BOILERS.

(1) Age Limits.

(a) There shall be an age limit of 30 years for any non-standard existing power boiler, except for the following:

1. Any such boiler not having a lap-riveted longitudinal joint may be continued in operation for so long as no distress or leakage develops during a pressure test, of 80% of the allowable working pressure, held for a period of at least 30 minutes.

2. Any such boiler having lap-riveted longitudinal joints and operating at a pressure in excess of 50 psig. shall have an age limit of 20 years. When removed from an existing setting, this type of boiler shall not be reinstated for a pressure in excess of 15 psig.

(b) The age limit for a standard existing power boiler shall be dependent upon the results of a thorough internal and external inspection and, where required by the inspector, a pressure test not exceeding 80% of the allowable working pressure. The power boiler may be continued under these test conditions.

(2) Maximum Allowable Working Pressure for Standard Boilers. The maximum allowable working pressure for standard boilers shall be determined in accordance with the applicable provisions of the edition of the ASME Code under which they were constructed.

(3) Maximum Allowable Working Pressure for Non-standard Boilers.

(a) The maximum allowable working pressure of a non-standard boiler shall be determined in accordance with the following formula. Non-standard boilers with welded seams shall not be operated at pressures exceeding 15 psig. for steam or 30 psig for water.

$\frac{TStE}{RFS}$ = maximum allowable working pressure (psig.)

Where:

TS = ultimate tensile strength of shell plate (psi)

t = minimum thickness of shell plate, in weakest course (inches)

E = efficiency of longitudinal joint (For tube ligaments, determine E by the rules provided in Section I of the ASME Code.

For riveted construction, refer to the National Board Inspection Code, 1973 edition.

For seamless construction, consider E to be 100%)

R = inside radius of weakest course of shell (inches)

FS = factor of safety permitted hereunder

(b) Tensile Strength - When the tensile strength of steel or wrought iron shell plates is not known, it shall be taken as 55,000 psi for steel and 45,000 psi for wrought iron.

(c) Crushing Strength of Mild Steel - The resistance to crushing of mild steel shall be taken as 95,000 psi.

(Rule 0800-3-3-.05, continued)

(d) Strength of Rivets in Shear - When computing the ultimate strength of rivets in shear, the following values in pounds per square inch of the cross-sectional area of the rivet shank shall be used:

	PSI
Iron rivets in single shear	38,000
Iron rivets in double shear	76,000
Steel rivets in single shear	44,000
Steel rivets in double shear	88,000

When the diameter of the rivet holes in the longitudinal joints of a boiler is not known, the diameter and cross-sectional area of rivets, after driving, may be selected from Table 1, or as ascertained by cutting out one rivet in the body of the joint.

TABLE 1
SIZES OF RIVETS BASED ON PLATE THICKNESS

Thickness of plate-in.	¼	9/32	5/16	11/32	3/8	13/32
Diameter of rivet after driving-in.	11/16	11/16	_	_	13/16	13/16

Thickness of plate-in.	7/16	15/32	½	9/16	5/8
Diameter of rivet after driving-in.	15/16	15/16	15/16	1-1/16	1-1/6

(e) Factors of Safety - The working pressure shall be decreased by the inspector if the condition and safety of the boiler warrant. The following factors of safety represent minimum values to be used:

The lowest factor of safety permissible on existing installation shall be 5.5; except that, for horizontal return-tubular boilers having continuous longitudinal lap-seams more than 12 feet in length, the factor of safety shall be 8. When this latter type of boiler is removed from its existing setting, it shall not be reinstalled for pressures in excess of 15 psig.

(4) Cast Iron Headers and Mud drums. The maximum allowable working pressure on a water tube boiler, the tubes of which are secured to cast iron or malleable iron headers, or which have cast iron mud drums, shall be 160 psig.

(5) Pressure on Cast Iron Boilers. The maximum allowable working pressure for any cast iron boiler, except hot water boilers, shall be 15 psig.

(6) Safety Valves.

(a) The use of weighted-lever safety valves, or safety valves having either the seat or disk of cast iron, is prohibited.

(b) Each boiler shall have at least one ASME/NB stamped safety valve; and if it has more than 500 square feet of water-heating surface, or an electric power input of more than 500 kw, it shall have two or more safety valves.

(c) The valve or valves shall be connected to the boiler, independent of any other steam connection, and attached as close as possible to the boiler, without unnecessary intervening pipe or fittings.

(d) No valve of any description shall be placed between the safety valve and the boiler, or on the escape pipe, if used. When an escape pipe is used, it shall be at least the full size of the safety

valve discharge and fitted with an open drain to prevent water lodging in the upper part of the safety valve or in the escape pipe. When an elbow is placed on a safety valve escape pipe, it shall be located close to the safety valve outlet; or the escape pipe shall be anchored and supported securely. All safety valve discharged shall be so located or piped as to be carried clear from walkways or platforms.

(e) The safety valve capacity of each boiler shall be such that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise to more than 6 percent above the highest pressure to which any valve is set, and in no case to more than 6 percent above the maximum allowable working pressure.

(f) One or more safety valves on every boiler shall be set at or below the maximum allowable working pressure. The remaining valves may be set within a range of 3 percent above the maximum allowable working pressure, but the range of setting of all the safety valves on a boiler shall not exceed 10 percent of the highest pressure to which any valve is set.

(g) When two or more boilers operating at different pressures and safety valves settings are interconnected, the lower pressure boilers or interconnected piping shall be equipped with safety valves of sufficient capacity to prevent overpressure, considering the maximum generating capacity of all boilers.

(h) Where the boiler is supplied with feedwater directly from water mains without the use of feeding apparatus (not to include return traps), no safety valve shall be set at a pressure greater than 94 percent of the lowest pressure obtained in the supply main feeding the boiler.

(i) The relieving capacity of the safety valves on any boiler shall be checked by one of the three following methods; and, if such capacity is found to be insufficient, additional valves shall be provided:

1. By making an accumulation test, which consists of shutting off all other steam discharge outlets from the boiler and forcing the fires to the maximum. The safety valve capacity shall be sufficient to prevent arise of pressure in excess of 6 percent of the maximum allowable working pressure. This method should not be used on a boiler with a superheater or reheater;

2. By measuring the maximum amount of fuel that can be burned and computing the corresponding evaporative capacity (steam generating capacity) upon the basis of the heating value of this fuel. These computations shall be made as outlined in the Appendix of the ASME Code, Section I; or

3. By measuring the maximum amount of feedwater that can be evaporated.

(7) Boiler Feeding.

(a) Each boiler shall have a feed supply which will permit it to be fed at any time while under pressure.

(b) A boiler having more than 500 square feet of water-heating surface shall have at least two suitable means of feeding, one of which shall be a feed pump. A source of feed at a pressure 6 percent greater than the set pressure of the safety valve with the highest setting may be considered one of the means. Boilers fired by gaseous, liquid, or solid fuel in suspension may be equipped with a single means of feeding water, provided means are furnished for the shutoff of heat input prior to the water level reaching the lowest safe level.

(Rule 0800-3-3-.05, continued)

(c) The feedwater shall be introduced into the boiler in such a manner that it will not be discharged close to riveted joints of shell or furnace sheets, or directly against surfaces exposed to products of combustion, or to direct radiation from the fire.

(d) The feed piping to the boiler shall be provided with a check valve near the boiler and a valve or cock between the check valve near the boiler. When two or more boilers are fed from a common source, there shall also be a valve on the branch to each boiler between the check valve and the source of supply. Whenever a globe valve is used on the feed piping, the inlet shall be under the disk of the valve.

(e) When deaerating heaters are not employed, it is recommended that the temperature of the feed water be not less than 120^{o} F to avoid the possibility of setting up localized stress. Where deaerating heaters are employed, it is recommended that the minimum feedwater temperature be not less than 215^{o} F so that dissolved gases may be thoroughly released.

(8) Water Level Indicators.

(a) No outlet connections (except for damper regulator, feedwater regulator, low water fuel cutout, drains steam gauges, or such apparatus that does not permit the escape of an appreciable amount of steam or water therefrom) shall be placed on the piping that connects the water column to the boiler. The water column shall be provided with a valved drain of at least ¾ inch pipe size, with the discharge to be piped to a safe location.

(b) Per ASME Section I, gauge cocks are no longer required.

(c) For all installations where the water gauge glass or glasses are more than 30 feet above boiler operating floor, remote water level indicating or recording gauges shall be installed at eye level.

(9) Steam Gauges.

(a) Each steam boiler shall have a steam gauge with dial range not less than 1½ times the maximum allowable working pressure, connected to the steam space or to the steam connection to the water column. The steam gauge shall be connected to a siphon (or equivalent device) of sufficient capacity to keep the gauge tube filled with water. Such siphon (or equivalent device) shall be so arranged that the gauge cannot be shutoff from the boiler, except by a cock with tee or lever handle placed in the pipe near the gauge. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

(b) When a steam gauge connection longer than 8 feet becomes necessary, a shut-off valve may be used near the boiler, provided the valve is of the outside-screw-and yoke type and is locked open. The line shall be of ample size, with provision for free blowing.

(c) Each boiler shall be provided with a ½ inch nipple and globe valve connected to the steam space, for the exclusive purpose of attaching a test gauge when the boiler is in service so that the accuracy of the boiler steam gauge may be ascertained.

(10) Stop Valves.

(a) Each steam outlet from boiler (except safety valve and water column connections) shall be fitted with a stop valve located as close as practicable to the boiler.

(b) When a stop valve is so located that water can accumulate, ample drains shall be provided. The drainage shall be piped to a safe location, and shall not be discharged on the top of the boiler or its setting.

(Rule 0800-3-3-.05, continued)

(c) When boilers provided with manholes are connected to a common steam main, the steam connection from each boiler shall be fitted with two stop valves having ample free blow drain between them. The discharge of the drain shall be visible to the operator while manipulating the valves, and shall be piped clear of the boiler setting. The stop valves should consist of one non-return valve (set next to the boiler) and a second valve of the outside-screw-and-yoke type.

(11) Blowoff Connection.

(a) The construction of the setting around each blowoff pipe shall permit free expansion and contraction. Careful attention shall be given to the problem of sealing these setting openings without restricting the movement of the blowoff piping.

(b) When exposed to furnace heat, all blowoff piping shall be protected by fire brick or other heat-resistant material, so constructed the piping may be inspected readily.

(c) Each boiler shall have a blowoff pipe, fitted with a valve or cock in direct connection with the lowest water space. Cocks shall be of the gland or guard type, and suitable for the pressure allowed. The use of globe valves is prohibited. When the maximum allowable working pressure exceeds 100 psig., each blowoff pipe shall be provided with two valves or a valve and cock.

(d) When the maximum allowable working pressure exceeds 100 psig., blowoff piping shall be at least extra-heavy steel from the boiler to the valve or valves, and shall be run full-size without use of reducers or bushings. The piping shall not be galvanized.

(e) All fittings between the boiler and blowoff valve shall be of steel. In case of renewal of blowoff pipe or fittings, they shall be installed in accordance with the rules for new installations. See Recommended Rules for National Board Boiler Blowoff Equipment.

(12) Repairs and Renewals of Boiler Fittings and Appliances. Whenever fittings or appliances are repaired or replaced, the work shall comply with the rules governing new installations.

(13) Conditions Not Covered by These Requirements. All cases not specifically covered by these requirements shall be treated as new installations, or may be referred to the Chief Inspector for instructions.

Authority: *T.C.A. §§4-5-202, 4-5- 202(a)(3), 68-122-101, 68-122-102, and 68-122-104.* ***Administrative History:*** *Original rule filed May 16, 1986; effective June 15, 1986. (Formerly rule 0780-2-11-.05) Amendment filed March 27, 1991; effective June 29, 1991. Amendment filed June 27, 2000; effective October 28, 2000. Amendment filed June 17, 2002; effective October 28, 2002.*

0800-3-3-.06 EXISTING HEATING BOILERS.

(1) Standard Boilers. The maximum allowable working pressure of standard boilers shall in no case exceed the pressure indicated by the manufacturer's identification stamped or cast on the boiler, or on a plate secured on it.

(2) Non-standard Riveted Boilers. The maximum allowable working pressure on the shell of a nonstandard riveted heating boiler shall be determined in accordance with rule 0800-3-3-.05(3) except that in no case shall the maximum allowable working pressure of a steam heating boiler exceed 15 psig., or a hot water boiler exceed 160 psig. or 250 degrees F temperature.

(3) Non-standard Welded Boiler. The maximum allowable working pressure of a non-standard steel or wrought iron heating boiler of welded construction shall not exceed 15 psig. for steam. For other than steam service, the maximum allowable working pressure shall be calculated in accordance with Section IV of the ASME Code, but in no case shall it exceed 30 psig.

(4) Non-standard Cast Iron Boilers.

(a) A maximum allowable working pressure of a non-standard boiler composed principally of cast iron shall not exceed 15 psig. for steam service or 30 psig. for hot water service.

(b) The maximum allowable working pressure of a non-standard boiler having cast iron shell or heads and steel or wrought iron tubes shall not exceed 15 psig. for steam service or 30 psig. for hot water service.

(5) Safety Valves.

(a) Each steam boiler shall have one or more ASME/National Board stamped safety valves of the spring pop-type adjusted and sealed to discharge at a pressure not to exceed 15 psi. Seals shall be attached in a manner to prevent the valves from being taken apart without breaking the seal. The safety valves shall be arranged so that they cannot be reset to relieve at a higher pressure than the maximum allowable working pressure of the boiler. A body drain connection below seat level shall be provided by the manufacturer and this drain shall not be plugged during or after field installation. For valves exceeding 2½ inches pipe size, the drain holes or holes shall be tapped not less than ? inch pipe size. For valves less than 2½ inches, the drain hole shall not be less than ¼ inch in diameter.

(b) No safety valve for a steam heating boiler shall be smaller than ½ inch unless the boiler and radiating surface consist of a self-contained unit. No safety valve shall be larger than 4½ inches. The inlet opening shall have an inside diameter equal to, or greater than, the seat diameter.

(c) The minimum relieving capacity of the valve or valves shall be governed by the capacity marking on the boiler.

(d) The minimum valve capacity in pounds per hour shall be the greater of that determined by dividing the maximum BTU output at the boiler nozzle obtained by the firing of any fuel for which the unit is installed by 1,000 or shall be determined on the basis of the pounds of steam generated per hour per square foot of boiler heating surface as given in Table 2. In many cases, a greater relieving capacity of valves will have to be provided than the minimum specified by these rules. In every case, the requirements of Item 5, Paragraph (e) shall be met.

TABLE 2
MINIMUM POUNDS OF STEAM PER HOUR
PER SQUARE FOOT OF HEATING SURFACE

	Firetube Boilers	Watertube Boilers
Boiler Heating Surface:		
Hand fired	5	6
Stoker fired	7	8
Oil, gas or pulverized fuel fired	8	10
Waterwall Heating Surface:		
Hand fired	8	8
Stoker fired	10	12
Oil, gas or pulverized fuel fired	14	16

(Rule 0800-3-3-.06, continued)

1. When a boiler is fired only by a gas giving a heat value not in excess of 200 BTU per cubic foot, the minimum safety valve or safety relief valve relieving capacity may be based on the value given for hand-fired boilers above.

2. The minimum safety valve or safety relief valve relieving capacity for electric boilers shall be 3½ pounds per hour per kilowatt Input.

3. For heating surface determination, see ASME Code, Section IV, Paragraph HG-403.

(e) The safety valve capacity for each steam boiler shall be such that, with the fuel-burning equipment installed and operating at maximum capacity, the pressure cannot rise more than 5 psig. above the maximum allowable working pressure.

(f) When operating conditions are changed, or additional boiler heating surface is installed, the valve capacity shall be increased (if necessary) to meet the new conditions and comply with this paragraph. When additional valves are required, they may be installed on the outlet piping, provided there is no intervening valve.

(g) If there is any doubt as to the capacity of the safety valve, an accumulation test shall be run (see ASME Code, Section VI, Recommended Rules for Care and Operation of Heating Boilers).

(h) No valve of any description shall be placed between the safety valve and the boiler, and on the discharge pipe between the safety valve and the atmosphere. The discharge pipe shall be at least full-size, and shall be fitted with an open drain to prevent water lodging in the upper part of the safety valve and in the discharge pipe. When an elbow is placed on the safety valve discharge pipe, it shall be located close to the safety valve outlet; and the discharge pipe shall be securely anchored and supported. All safety valve discharges shall be so located and piped as not to endanger persons in the area.

(6) Safety Relief Valve Requirements for Hot Water Boilers.

(a) Each hot water heating boiler shall have at least one ASME/National Board stamped safety relief valve set to relieve at or below the maximum allowable working pressure of the boiler. Each hot water supply boiler shall have at least one ASME/National Board Stamped safety relief valve of the automatic reseating type set to relieve at or below maximum allowable working pressure of the boiler Safety relief valves, ASME/National Board stamped as to capacity, shall have pop action when tested by steam. When more than one safety relief valve is used on either hot water-heating or hot water-supply boilers, the additional valve or valves shall be ASME/NB rated, and may be set within a range not to exceed 6 psig. above the maximum allowable working pressure of the boiler up to and including 60 psig., and 5 percent for those having a maximum allowable working pressure exceeding 60 psig. Safety relief valves shall be spring loaded. Safety relief valves shall be so arranged that they cannot be reset at a higher pressure that the maximum permitted by this paragraph.

(b) No materials liable to fail due to deterioration or vulcanization when subject to saturated steam temperature corresponding to capacity test pressure shall be used for any part.

(c) No safety relief valve shall be smaller than ¾ inch nor larger than 4½ inches standard pipe size, except that boilers having a heat input not greater than 15,000 BTU per hour may be equipped with a safety relief valve of ½ inch standard pipe. The inlet opening shall have an inside diameter approximately equal to, or greater than, the seat diameter. In no case shall the minimum opening through any part of the valve be less than ¼ inch in diameter or its equivalent area.

(Rule 0800-3-3-.06, continued)

(d) The required steam relieving capacity, in pounds per hour, of the pressure relieving device or devices on a boiler shall be the greater of that determined by dividing the maximum output in BTU at the boiler nozzle obtained by the firing of any fuel for which the unit is installed by 1,000 or shall be determined on the basis of pounds of steam generated per hour per square foot of boiler heating surface as given in Table 2. In many cases, a greater relieving capacity of valves will have to be provided than the minimum specified by these rules. In every case, the requirements of Item 6, Paragraph (f) shall be met.

(e) When operating conditions are changed, or additional boiler heating surface is installed, the valve capacity shall be increased, if necessary, to meet the new conditions and shall be in accordance with Table 2 and Paragraph (f). The additional valves required, on account of changed conditions, may be installed on the outlet piping provided there is no intervening valve.

(f) The safety relief valve capacity for each boiler shall be such that, with the fuel burning equipment installed and operating at maximum capacity, the pressure cannot rise more than 5 psig. above the maximum allowable working pressure for steam heating boilers, and 10 percent above maximum allowable working pressures for hot water boilers.

(g) If there is any doubt as to the capacity of the safety relief valve, an accumulation test shall be run (see ASME Code, Section VI. Recommended Rules for Care and Operation of Heating Boilers).

(h) No valve of any description shall be placed between the safety relief valve and the boiler, and on the discharge pipe between the safety relief valve and the atmosphere. The discharge pipe shall be at least full-size, and shall be fitted with an open drain to prevent water lodging in the upper part of the safety relief valve or in the discharge pipe. When an elbow is placed on the safety relief valve discharge pipe, it shall be located close to the safety relief valve outlet; and the discharge pipe shall be properly supported. All safety relief valve discharges shall be so located and piped as not to endanger persons in the area.

(7) Steam Gauges.

(a) Each steam boiler shall have a steam gauge connected to its steam space, its water column, or its steam connection, by means of a siphon or equivalent device exterior to the boiled. The siphon (or equivalent device) shall be a sufficient capacity to keep the gauge tube filled with water and shall be so arranged that the gauge cannot be shut off from the boiler except by a cock with tee or lever handle placed in the pipe near the gauge. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

(b) The scale on the dial of a steam gauge shall be graduated to not less than 30 psig. nor more than 60 psig. The gauge shall be provided with effective stops for the indicating pointer at the zero point and at the maximum pressure point. The travel of the pointer from zero to 30 psig. pressure shall be at least 3 inches.

(8) Pressure or Altitude Gauges and Thermometers.

(a) Each hot water boiler shall have a pressure or altitude gauge connected to it or to its flow connection in such a manner that it cannot be shut off from the boiler, except by a cock with tee or lever handle placed on the pipe near the gauge. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

(b) The scale on the dial of the pressure or altitude gauge shall be graduated approximately to not less than 1½ nor more than 3 times the maximum allowable working pressure.

(Rule 0800-3-3-.06, continued)

(c) Piping or tubing for pressure or altitude gauge connections shall be of nonferrous metal when smaller than 1 inch pipe size.

(d) Each hot water boiler shall have a thermometer so located and connected that it will be easily readable when observing the water pressure or altitude gauge. The thermometer shall be so located that it will at all times indicate the temperature in degrees Fahrenheit of the water in the boiler at or near the outlet.

(9) Water Gauge Glasses.

(a) Each steam boiler shall have one or more water gauge glasses attached to the water column or boiler by means of valved fittings. The lower fitting shall be provided with a drain valve of the straightaway type, with opening not less than ¼ inch diameter to facilitate cleaning. Gauge glass replacement shall be possible while the boiler is under pressure.

(b) Transparent material, other than glass, may be used for the water gauge, provided that the material has proven suitable for the pressure temperature and corrosive conditions encountered in service.

(10) Stop Valves and Check Valves.

(a) If a boiler may be closed off from the heating system by closing a steam stop valve, there shall be a check valve in the condensate return line between the boiler and the system.

(b) If any part of a heating system may be closed off from the remainder of the system by closing a steam stop valve, there shall be a check valve in the condensate return pipe from the part of the system.

(11) Feedwater Connections.

(a) Feedwater, make-up water, or water treatment shall be introduced into a boiler through the return piping system or through an independent feedwater connection which does not discharge against parts of the boiler exposed to direct radiant heat from the fire. Feedwater, make-up, or water treatment shall not be introduced through openings or connections provided for inspection or cleaning, safety valve, safety relief valve, surface blowoff, water column water gauge glass, pressure gauge or temperature gauge.

(b) The feedwater pipe shall be provided with a check valve near the boiler and a stop valve or cock between the check valve and the boiler or return pipe system.

(12) Return Pump. Each boiler equipped with a condensate return pump shall be provided with a water level control arranged to automatically maintain the water level in the boiler within the range of the gauge glass.

(13) Repairs and Renewals of Fittings and Appliances. Whenever fittings or appliances are repaired or replaced, the work shall comply with the rules governing new installations.

Authority: *T.C.A. §§4-5-202, 4-5-202(a)(3), 68-122-101, 68-122-102, and 68-122-104.* ***Administrative History:*** *Original rule filed May 16, 1986; effective June 15, 1986. (Formerly rule 0780-2-11-.06) Amendment filed March 27, 1991; effective June 29, 1991. Amendment filed June 27, 2000; effective October 28, 2000. Amendment filed June 17, 2002; effective October 28, 2002.*

0800-3-3-.07 EXISTING PRESSURE VESSELS.

(1) Maximum Allowable Working Pressure for Standard Pressure Vessels. The maximum allowable working pressure for standard vessels shall be determined in accordance with the applicable provisions of the ASME Code or the API-ASME Code. The maximum allowable working pressure shall not be increased to a greater pressure than shown on the manufacturer's nameplate stamping and data report unless prior approval is obtained from the Chief Inspector.

(2) Maximum Allowable Working Pressure for Non-standard Pressure Vessels.

(a) The maximum allowable working pressure of a non-standard pressure vessel shall be determined in accordance with the following formula:

$\frac{TStE}{RFS}$ = maximum allowable working pressure, (psig)

Where:

TS = ultimate tensile strength of shell plate (psi).

(When the tensile strength of carbon steel is not known, assume 55,000 psi for temperatures not exceeding 650°F. For other materials, use the lowest stress values for that material from Section VIII, ASME Code).

t = minimum thickness of shell of weakest course (inches)

E = efficiency of longitudinal joint depending upon construction.

(For riveted joints-calculated riveted efficiency; for fusion-welded and brazed joint):

	Percent
Single lap weld	40
Double lap weld	50
Single butt weld	60
Double butt weld	70
Forge weld	70
Brazed steel	80

R = inside radius of weakest course in shell (inches), provided the thickness does not exceed 10% of the radius. If the thickness is over 10% of the radius, use the outer radius.

FS = factor of safety permitted hereunder.

(b) The minimum factor of safety shall in no case be less than 5 for existing installations. The working pressure shall be decreased when deemed necessary by the inspector to insure the operation of the vessel and the particular service to which it is subject will be the determining factors.

(c) The maximum allowable working pressure permitted for formed heads under pressure shall be determined by using the appropriate formulas from ASME Code Section VIII, Division 1,and the tensile strength and factors of safety given in this paragraph.

(d) The maximum allowable working pressure for non-standard pressure-vessels subject to external pressure shall be determined by the rules of ASME Code Section VIII, Division 1.

(Rule 0800-3-3-.07, continued)

(3) Inspection of Inaccessible Parts. Where, in the opinion of the inspector, as the result of conditions disclosed at the time of inspection, it may be necessary to remove interior or exterior lining, covering, or brickwork to expose certain parts of the vessel not normally visible, the owner or user shall remove such material to permit proper inspection and to determine remaining thickness.

(4) Overpressure Protection. Each pressure vessel shall be provided with safety relief valves and controlling devices as necessary to protect against overpressure. These devices shall be so constructed, located and installed that they cannot be rendered inoperative. The relieving capacity of such pressure relief devices shall be adequate to prevent a rise in pressure in the vessel of no more than 10 percent above the highest pressure to which any pressure relieving device is set. The opening pressure of the lowest set pressure relieving device shall be no greater than the maximum allowable working pressure of the vessel. Where an additional hazard is involved due to fire or other unexpected sources of external heat, the pressure relief devices shall meet the requirements of ASME Code Section VIII, Division 1, Paragraph UG-125 or Division 2, Paragraph AR-150, whichever is applicable.

(5) Repairs and Renewals of Fittings and Appliances. Whenever repairs are made to fittings and appliances or it becomes necessary to replace them, the work must comply with the requirements for new installations.

Authority: *T.C.A. §§4-5-202, 4-5-202(a)(3), 68-122-101, 68-122-102, and 68-122-104.* ***Administrative History:*** *Original rule filed May 16, 1986; effective June 15, 1986. (Formerly rule 0780-2-11-.07) Amendment filed March 27, 1991; effective June 29, 1991. Amendment filed June 27, 2000; effective October 28, 2000. Amendment filed June 17, 2002; effective October 28, 2002.*

0800-3-3-.08 HISTORIC BOILERS.

(1) These rules apply to "historic power boilers" as defined in Rule 0800-3-3-.01(34).

(2) The maximum allowable working pressure shall be calculated with a minimum safety factor of 6 using the formula for existing power boilers in 0800-3-3-.05(3)(a) not to exceed 100 psig. The issuance of the annual operating permit will be based on the results of the annual inspection by the inspector.

(3) The minimum safety factor shall be 8 for the historic boilers having lap-riveted longitudinal joints. The maximum allowable working pressure should not exceed 100 psig. The issuance of the annual operating permit will be based on the results of the annual inspection by the inspector.

(4) An annual inspection shall be conducted, by a deputy inspector, pursuant to issuance of an annual operating permit with a valid Tennessee Registration Number.

(5) A pressure test, not to exceed the maximum allowable working pressure, may be conducted, at the discretion of the deputy inspector.

(6) The historic boiler shall be equipped with an ASME-stamped National Board-rated safety valve of adequate capacity, together with a water level indicator, calibrated pressure gauge and two suitable means of introducing water into the boiler.

(7) Any repairs or alterations shall be performed by organizations holding a valid National Board "R" stamp. If the repair or alteration is performed in this State, the "R" stamp-holder must have a current State of Tennessee Boiler Repair and Erection Contractor's License.

(8) All historical boilers classified as "standard" must have legible stamping clearly visible to the inspector.

Authority: *T.C.A. §§4-5-202(a)(3), 68-122-101, 68-122-102, and 68-122-104.* ***Administrative History:*** *Original rule filed January 31, 1995; effective May 31, 1995. Amendment filed June 27, 2000; effective October 28, 2000.*

0800-3-3-.09 FEES.

(1)	For shop inspections of boilers and pressure vessels and for manufacturer's and contractor's boilers and pressure vessel quality control system reviews:		
	(a)	For one-half (½) day of four (4) hours	$250.00
	(b)	For one (1) full day of eight (8) hours	$500.00
(2)	For special boiler and pressure vessel inspections and second-hand inspections:		
	(a)	For one-half (½) day of four (4) hours	$250.00
	(b)	For one (1) full day of eight (8) hours	$500.00
(3)	Boilers Inspection Fees (Fired Vessels):		
	(a)	Boilers of 5 H.P. or less, or 50 sq. ft. or less of heating surface	$30.00
	(b)	Boilers over 5 H.P. or over 50 sq. ft. of heating surface	$30.00
	(c)	External inspections	$20.00
	(d)	Inspection of heating boilers	$15.00
(4)	Boiler Inspection Fees (unfired vessels):		
	(a)	Internal and/or external inspection of each unfired pressure vessel subject to inspection having a cross-sectional area of fifty (50) square feet or less is	$15.00
	(b)	For each additional one hundred (100) square feet or fraction thereof, of area in excess of fifty (50) square feet is	$6.00
		Not more than seventy-five dollars ($75.00) shall be paid per day for the actual inspection time of each inspector on any one (1) vessel.	
(5)	Examination fee (non-refundable)		$100.00
(6)	Certificate of Competency fee (non-refundable)		$50.00
(7)	Identification card fee (non-refundable) Annual renewal		$25.00
(8)	Inspection certificates fees:		
	(a)	For power boilers	$25.00
	(b)	For low pressure heating boilers and unfired pressure vessels	$40.00
(9)	License fee:		
	(a)	Original license (first year)	$50.00
	(b)	Annual renewal license	$30.00

(Rule 0800-3-3-.09, continued)

Authority: *T.C.A. §§4-5-202(a)(3), 68-122-101 through 68-122-104, 68-122-106, 68-122-111, 68-122-113, and 68-122-116.* ***Administrative History:*** *Original rule filed March 27, 1991; effective June 29, 1991. (Formerly 0080-3-3-.08) Amendment filed June 27, 2000; effective October 28, 2000. Amendment filed March 30, 2001; effective July 30, 2001.*